Field Examination of Nimpkish River Sockeye Timing and Migration Pathways in 1981 and 1982.

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April 1985

Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 1797

86-04989/

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Canadian Manuscript Report of

Fisheries and Aquatic Sciences 1797

April, 1985

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by

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Minister of Supply and Services Canada, 1985.

Cat. No. Fs97-4/1797 ISSN 0706-6473

The correct citation for this report is:

Gould, A.P. and A.P. Stefanson, 1985. Field Examination of Nimpkish River Sockeye Timing and Migration Pathways in 1981 and 1982. Can. MS Rep. Fish. Aquat. Sci. 1797: iv + 51 pages.

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ABSTRACT

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Scale analysis was used to identify Nimpkish sockeye from a mixed stock fishery in Johnstone Straits so that more effective in-season management could be developed. Field programs in 1981 and 1982 consisted of gillnet test fishing, an intensive scale sampling program and commercial catch sampling. Results are presented in terms of Nimpkish migration route and run timing, exploitation rate on Nimpkish sockeye, as well as analysis of age and length characteristics. Nimpkish sockeye are found to exhibit differences, not only in scale patterns, but also in migration route and population age structure. Exploitation rates are also summarized.

Key Words: evaluating, closures, exploitation, sockeye, test fishing, migration, scales, C.P.U.E., Nimpkish.

RESUMÉ

Gould, A.P. and A.P. Stefanson, 1984. Field Examination of Nimpkish River Sockeye Timing and Migration Pathways in 1981 and 1982. Can. MS Rept. Fish. Aquat. Sci. 1797: iv + 51 pages.

RÉSUMÉ

On s'est servi de l'analyse scalimétrique pour identifier le saumon rouge de la rivière Nimpkish, présent dans les prises polyspécifiques du détroit de Johnstone, en vue d'élaborer une stratégie qestionnelle plus efficace de la pêche. En 1981 et 1982, les programmes sur le terrain comprenaient une pêche expérimentale au filet maillant, un programme intensif d'échantillonnage des écailles et l'échantillonnage de la prise commerciale. Les résultats mont présentés en termes du régime migratoire et du moment de la remonte dans la Nimpkish, du taux d'exploitation du saumon rouge de la Nimpkish et des analyses des âges et des longeurs. On a découvert des différences non seulement dans les caractéristiques des écailles, mais aussi dans les régime migratoires et la structure par âge de la population. Le document comporte en outre un résumé des taux d'exploitation.

Mots-clés: évaluation, fermetures, exploitation, saumon rouge, pêche expérimentale, migration, écailles, C.P.U.E., Nimpkish.

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INTRODUCTION

The Nimpkish River sockeye stock, at one time a major contributor to British Columbia's total sockeye production, has declined dramatically in the last 10 years. During the late 1970's, the Department of Fisheries and Oceans instituted special area and timing closures in order to minimize the exploitation of Nimpkish River sockeye based on assumptions of Nimpkish sockeye migration timing and routes. When analysis of the catch in subsequent years indicated a substantial component of Nimpkish sockeye, the assumptions regarding timing and migration routes were reviewed.

Nimpkish River sockeye and other south coast sockeye stocks, notably the Fraser River stocks, can be separated using scale analysis techniques (I.P.S.F.C., 1961). This method is used to separate the catch into its components in Johnstone Strait (Anderson, 1976).

Nimpkish sockeye migrate from mid-June to early August through the Queen Charlotte-Johnstone Strait commercial fishing area, which constitutes a complex mixed-stock fishery targeting on the more abundant Fraser River sockeye. Depending on the cycle year and rate of diversion, through Johnstone Strait rather than Juan de Fuca Strait, these are harvested annually from late June to mid-September and pose an overexploitation problem for the Nimpkish stocks. The Department of Fisheries and Oceans began applying special area and timing closures in order to minimize exploitation of Nimpkish sockeye, based on assumptions that local stocks use primarily Broughton Strait in the final approach to their spawning destination. It was also assumed they were early-timed stocks, arriving in the estuary before mid-July. In the 1981 and 1982 programs, test fishing and scale sampling were initiated in order to verify stock migration patterns and timing so that these stock management assumptions could be evaluated.

This report summarizes the field program undertaken to verify Nimpkish sockeye timing and migrations. Specifically, test fishing and scale sampling results are presented so that population characteristics, migration route and level of harvest in the commercial fishery can be discussed.

AREA DESCRIPTION

Nimpkish-bound sockeye, mixed with Fraser River and other south coast sockeye, enter the area from the north by way of Queen Charlotte Sound. Those stocks destined for the Nimpkish River system use one of two approach routes; passing through Broughton Straits or along the north shore of Malcolm Island (Figure 1). The peak sockeye migration of both Fraser and Nimpkish stocks occurs primarily during the months of July and August.

Exploitation of these stocks in Queen Charlotte and Johnstone Straits occurs mainly with seine and gillnet, however, trolling effort, which commences in mid April, also may have an impact on sockeye stocks. Sport effort is minimal and restricted to the Nimpkish estuary and river.

Figure 1: Approach Routes for Nimpkish Sockeye.

The different gear types generally segregate themselves to avoid competition and to maximize catch efficiency. As a result, gillnet boats usually fish east of Port Hardy Bay and on the north shore of Malcolm Island. Both locations have some limited competition with seine boats, although locations near Christie Pass, the north shore of Malcolm Island, Double Bay and upper Johnstone Straits, attract most of the seine vessel effort. Troll vessels generally fish the Malcolm Island and Blackfish Sound areas.

The Nimpkish watershed, located on the north coast of Vancouver Island, has a drainage area of over 1,240 square kilometers and has been a prime source of cedar and Douglas fir for the past century. Nimpkish Lake, the major water storage and nursery area in the system, has an elevation of 19.8 meters and is approximately 21.9 km in length. The upper watershed consists of eight lakes, five of which are oligotrophic and set similarly in deep valleys surrounded by mountains. The remaining three lakes are eutrophic, in wide-open valleys bordered by low hills and swamp area (Anon., 1958). Sockeye salmon are found spawning and rearing virtually throughout the system: the primary areas are Nimpkish River, Woss River and Woss Lake (Figure 2). For further information regarding the freshwater biology of this stock, the reader is referred to the Area 12 stream catalogue (D.E. Marshall et al, 1977).

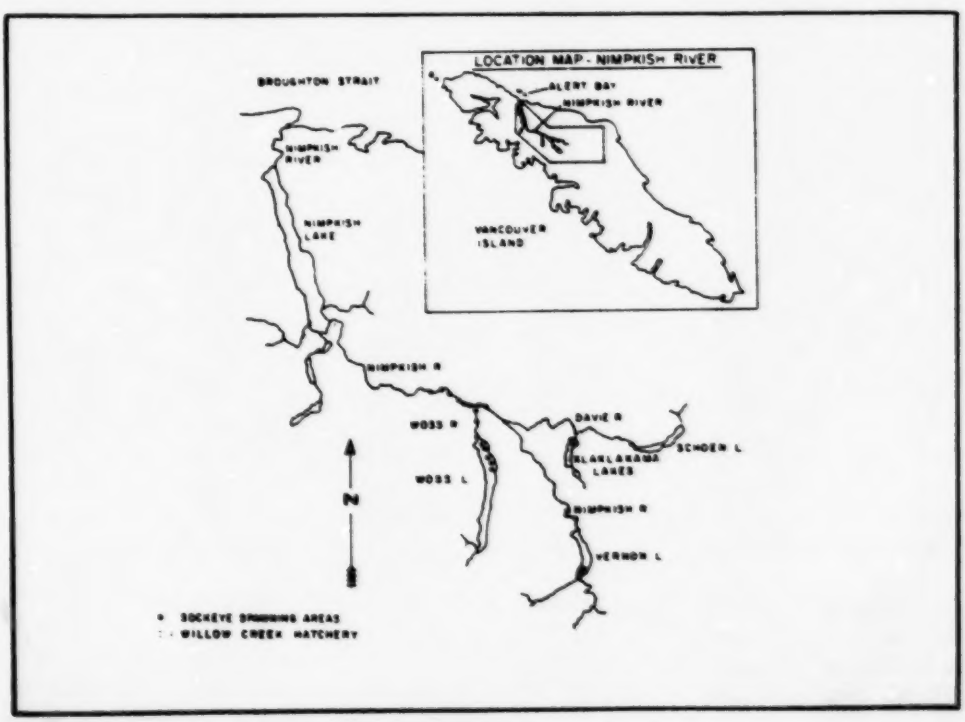

FIGURE 2: Nimpkish River System.

TABLE 1: Salmon Escapement Record for Nimpkish River, 1947 to 1984.

Year	Sockeye	Chinook	Coho	Chum	Pink
1947[a]	UK	UK	UK	UK	UK
1948	UK	UK	UK	UK	UK
1949	100,000+	3,500	15,000	100,000+	7,500
1950	100,000+	7,500	7,500	100,000+	15,000
1951	100,000+	15,000	15,000	75,000	7,500
1952	100,000+	15,000	15,000	100,000+	15,000
1953	100,000+	15,000	15,000	75,000	3,500
1954	75,000	15,000	7,500	35,000	3,500
1955	75,000	15,000	15,000	75,000	1,500
1956	75,000	7,500	15,000	35,000	3,500
1957	130,000	3,500	11,000	30,000	1,500
1958	75,000	7,500	7,500	35,000	3,500
1959	75,000	7,500	7,500	15,000	3,500
1960	75,000	7,500	7,500	35,000	3,500
1961	75,000	7,500	15,000	35,000	3,500
1962	100,000+	15,000	35,000	15,000	3,500
1963	150,000	7,500	35,000	15,000	1,500
1964	100,000+	7,500	15,000	15,000	3,500
1965	30,000	3,500	35,000	15,000	400
1966	120,000	1,500	15,000	35,000	7,500
1967	100,000	1,500	3,500	15,000	400
1968	35,000	7,500	7,500	55,000	15,000
1969	100,000	400	1,500	7,500	400
1970	50,000	6,000	30,000	18,000	4,000
1971	75,000	900	12,000	5,000	4,000
1972	60,000	6,500	7,500	20,000	12,000
1973	100,000	10,000	14,000	25,000	N/O
1974	150,000	4,000	8,000	5,000	12,000
1975	40,000	1,100	2,000	8,000	600
1976	35,000	3,500	7,500	6,000	400
1977[b]	15,000	750	1,500	15,000	-
1978	8,500	1,300	2,500	15,500	1,700
1979	20,000	500	500	6,000	N/O
1980	24,000	300	500	14,000	7,500
1981	60,000	700	2,500	10,000	700
1982	60,000	600	UK	55,000	1,500
1983	70,000	1,500	1,000	7,500	100
1984	49,000	300	3,000	20,000+	-
47-54 Avg	95,833	11,833	12,500	80,833	8,667
55-64 Avg	93,000	8,600	16,350	30,500	2,900
65-74 Avg	82,000	4,280	13,500	20,050	6,189
74-84 Avg	38,150	1,055	2,333	15,700	1,786

[a]Data from 1947 - 1976: Area 12 Stream Catalogue (Marshall et al, 1977).

[b]Data from 1977 on, provided by the Alert Bay Department of Fisheries and Oceans office.

METHODS

The methodology for this study was based on the examination of scale patterns to distinguish between Nimpkish and non-Nimpkish sockeye stocks. The field programs in 1981 and 1982 consisted of test fishing using two gillnet vessels, primarily to determine timing and migration patterns of sockeye entering the area. Intensive scale sampling was conducted, in order to correlate this data on a stock basis and provide age and age-length characteristics for the populations. A third component, scale-sampling of the commercial sockeye harvest in Area 12, was conducted during periods of commercial harvests.

1. Test Fishing

In 1981, the gillnet test program fished weekly (3 - 4 days) during non-commercial fishing periods, using 127 mm (5") mesh, 60 mesh deep by 365.75 (200 fathom) sockeye nets. Two vessels fished in predetermined areas and tides, as in a regular fishery, from June 10 to August 4. Initially, test fishing was conducted in the upper Queen Charlotte Sound to determine the arrival time of Nimpkish sockeye. For the balance of the program, the boats moved southeast and fished largely in Broughton Straits and on the north shore of Malcolm Island (Figure 3).

The 1982 program was basically similar to that conducted in 1981, except that pre-determined fishing times were established prior to the program start. The test program was conducted 3 - 4 days weekly. Six sets were made by each vessel per day for a total soak time of 30 minutes per set. Established fishing locations were also pre-set. The program started on June 20 and continued through to August 1 in the Broughton Strait - North shore Malcolm Island areas.

Test catches were recorded by species, area of catch and net fishing time. Sockeye test catches were adjusted to catch per unit effort (C.P.U.E.) based on 1,000 minutes of fishing time and separated by area and stock (Nimpkish or non-Nimpkish sockeye). Appendix III details the field test catch data sheets. Sockeye were sampled for postorbital-hypural and fork length and scales were removed for age and stock determination (Appendix IV). Unfortunately, it was not possible to determine sex from sampled fish due to marketing restrictions.

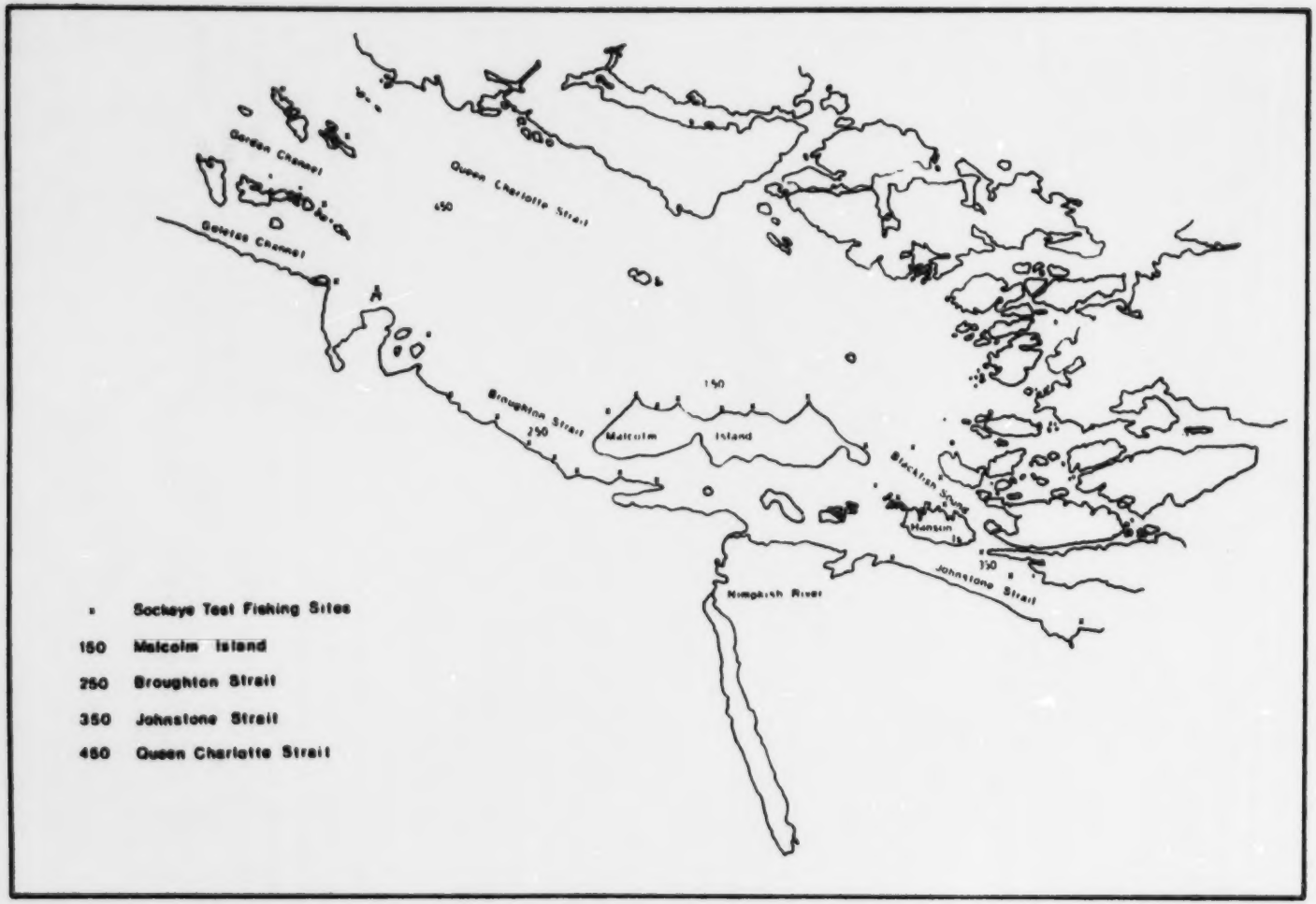

FIGURE 3: Location of Test Fisheries.

2. Scale Sampling

Past years' scale analysis comparisons of Nimpkish and Fraser River sockeye have revealed significant differences; enough to enable identification in a mixed stock fishery (A.D. Anderson, 1976; Y. Yole, pers. comm.). Using this method, Nimpkish and non-Nimpkish sockeye were differentiated and subsequent analyses of migration pattern, timing and population characteristics, such as age and length, were performed on a stock basis.

A minimum of one hundred sockeye scale samples, when available (percentage of each drift's catch) were taken daily by a sampler aboard each of the two test vessels. The scales were delivered twice weekly to Sointula in 1981 and Port McNeil in 1982, and read by Field Services staff relocated from Vancouver for the program. Scales were read for age and coded as either Nimpkish or non-Nimpkish (primarily Fraser with minor numbers of Heydon, Phillips or Sakinaw sockeye stocks).

3. Commercial Fishery Sampling

Commercial gillnet and seine catches were sampled each week from commercial fishing areas throughout the Area 12 sockeye harvest season. A D.F.O. technician collected 200 to 400 sockeye scales after the termination of each weekly fishing period, either by boarding individual commercial vessels or by sampling deliveries to local fish plants. It was not possible to determine sex or take length measurements from commercial samples because of time and quality constraints.

The commercial sampling program was conducted in several fishing areas and the data have been averaged and presented as percent Nimpkish sockeye from two areas:

a) the area above Blinkhorn/Hanson Island/East Cracroft Point boundary which includes the Gordon/Goletus Island groups and the north shore of Malcolm Island; and

b) the area below the Blinkhorn/Hanson Island/East Cracroft Point boundary.

All data was recorded on coding sheets and analyzed using the VAX 11/780 computer at the Pacific Biological Station in Nanaimo, B.C.

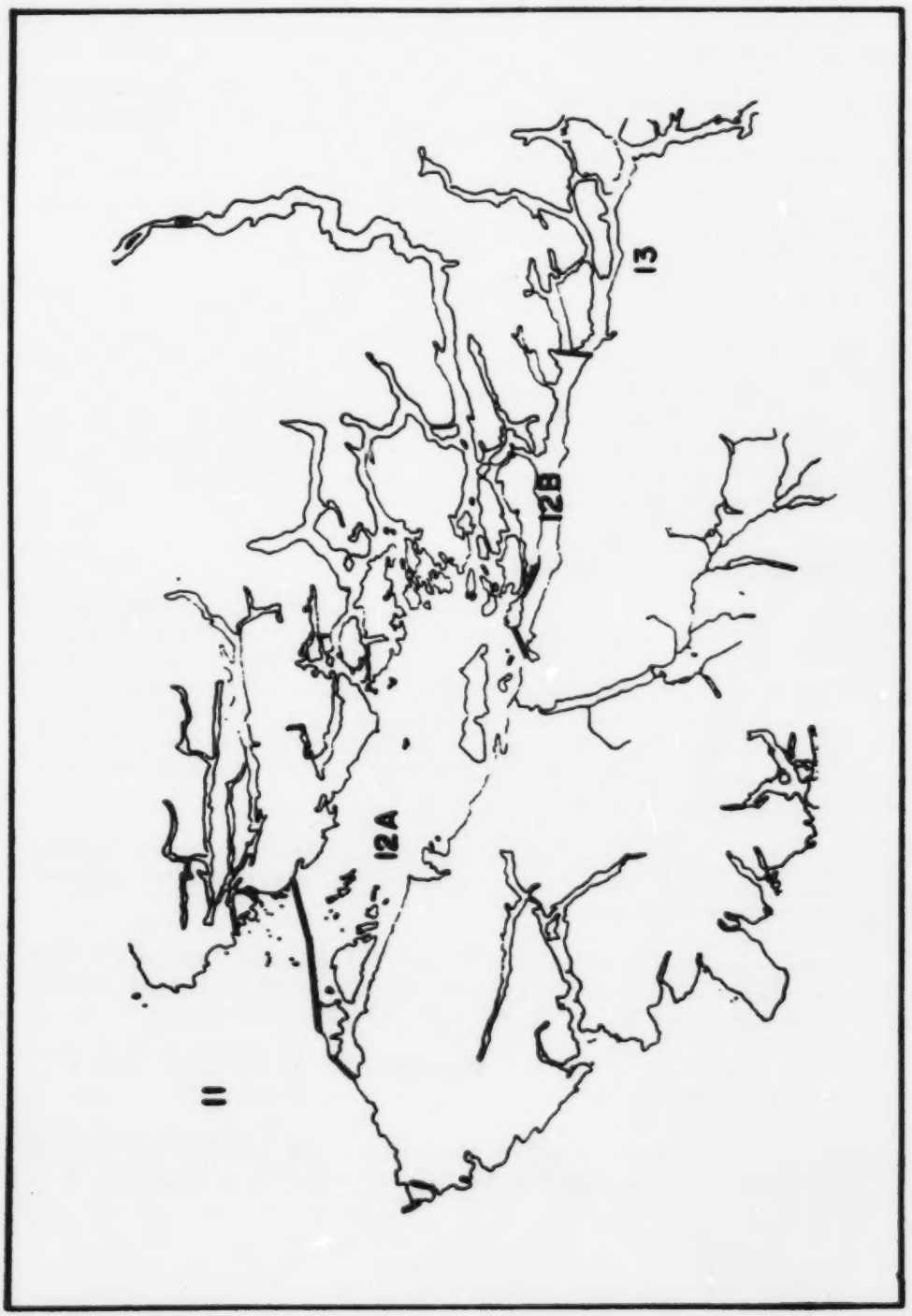

FIGURE 4: Commercial Fishery Sampling Areas.

RESULTS AND DISCUSSION

1. Migration Pattern

In estimating the relative catches of each stock, week and area, a standardized fishing effort of 1000 minutes soak time per boat per day was used. Furthermore, catches are grouped in major catch areas, although the boats may have fished several locations within the area.

Tables 3 and 4 illustrate weekly test fishing summaries and Appendix Tables III a-e, detail daily catch records for all species caught.

In a preliminary review of differences between gear and efficiencies, both boats and gear were inspected to determine any differences. As well, both boats were fished side by side to determine if bias existed between the vessels and skippers. No differences appeared to present themselves, although each skipper's preferred fishing period differed in 1981 (Table 3; length of fishing time was at the discretion of the skipper in 1981). In 1982, the length of fishing time was shortened (in response to suggestions from local staff) and standardized between the boats as much as possible.

The results in 1981 indicated the major approach route for Nimpkish sockeye to be through Broughton Strait. A similar and more pronounced result occurred in 1982. Table 2 details the proportion each week moving through Broughton Strait compared to the total migration through both areas for 1981 and 1982 (Appendix III details the catches and C.P.U.E.'s for all species). The data also illustrates that in both areas, for 1981 and 1982, the Nimpkish sockeye stock is the minor component in all weeks except the second week of June in 1981 and the fourth week of June in 1982 (Area 250 only). Figure 5 illustrates the C.P.U.E. components for 1981 and 1982 compared to the total C.P.U.E. by areas 150 and 250.

By weighting the proportion of Nimpkish sockeye each week by the total abundance each week for both migration areas the data indicates for 1981 75.2% and for 1982 92.2% of Nimpkish sockeye approached the river via Broughton Strait.

The data details the decline in the C.P.U.E. (migration timing) after the 7/4 weekending. Only 11.1% of the stock migrated after the 7/4 weekending in 1981 and 1.5% in 1982 (50% of stock passed). The peak migration period was during the week 7/2 in both 1981 and 1982 based on the data gathered.

TABLE 2 - Relative Proportions of Nimpkish Sockeye Migrating Through Broughton Straits, Expressed as Percentages of the Total C.P.U.E. for Area 150 and 250

Week Ending	1981	1982
6/2[a]	73.9	-
6/3	69.0	-
6/4	66.4	94.4
7/1	81.8	93.1
7/2	79.8	88.3
7/3	N/A	92.8
7/4	73.2	92.5
7/5	71.2	100.0
8/1	69.7	100.0

[a]Dates are designated by month and week; thus 6/2 is the sixth month (June) and the second week.

The timing of the Nimpkish run, within the overall sockeye migration, is obscured by the presence of commercial fisheries intercepting sockeye prior to entering the test fishing areas, particularly in 1981 (Table 5).

2. Catch of Nimpkish Sockeye

Department of Fisheries and Oceans final catch statistics are not collected in a fashion allowing an unbiased accounting of the Nimpkish sockeye catch. Specifically, the catch information collected in the commercial gillnet, seine and troll fisheries lack detail concerning the subdivision of catch within the Area 12 total. An attempt, based solely on field estimates of catch, was made in 1981 and 1982 to apportion catches by area and to subsample the commercial catch in various areas to determine the Nimpkish sockeye catch component and, hence, the total Nimpkish sockeye catch. It is important to understand that this may not accurately reflect the true Nimpkish sockeye catch and was an approach used by field technical and fishery officer staff to estimate the exploitation rates on Nimpkish sockeye.

Tables 5 and 6 contain weekly calculations of Nimpkish sockeye harvests. Preliminary field estimates were used based on sales slip information gathered during each weeks' fishery for 1981 and 1982. The estimated catch for above the Blinkhorn boundary and below was calculated by dividing the total estimated gillnet and seine catch for Area 12 by the gear count in each area. The apportioned catch was further subdivided in the below Blinkhorn component because of the distribution of Nimpkish sockeye being limited to the upper portion of Johnstone Strait. (A.D. Anderson, N. Lemmen, pers. comm.). It was estimated that only 65% of the gillnet and 50% of the seine catch below the Blinkhorn boundary should be used in calculations of the potential Nimpkish catch.

TABLE 3 - Weekly Catch, Effort and Stock Determination Data from Test Fishing in Areas 150 and 250, North Shore of Malcolm Island and Broughton Straits, Respectively, in 1981 (See Figure 5).

Week Ending	Minutes Fished (1000's)	Number of Sockeye			Stock		C. P. U. E.[a]			% Nimpkish[b]
		Catch	Sample	%	Nimpkish	Non-Nimpkish	Total	Nimpkish	Non-Nimpkish	
Area 150:										
6/2	.932	8	5	62.50	4	1	8.58	6.87	1.72	80.00
6/3	2.067	49	47	95.92	19	28	23.71	9.58	14.12	40.43
6/4	1.355	98	91	92.86	25	66	72.32	19.87	52.46	27.47
7/1	1.701	371	191	51.48	21	170	218.11	23.98	194.13	10.99
7/2	3.332	467	373	79.87	64	309	140.16	24.05	116.11	17.17
7/3	3.167	514	410	79.77	95	315	162.30	37.61	124.69	23.17
7/4	3.205	775	355	45.81	74	281	241.81	50.41	191.40	20.85
7/5	1.745	173	137	79.19	19	118	99.14	13.75	85.39	13.87
8/1	1.367	64	43	67.19	6	37	46.82	6.53	40.29	13.95
Area 250:										
6/2	.977	19	17	89.47	17	0	19.45	19.45	0	100.00
6/3	.937	43	41	95.35	19	22	45.89	21.27	24.62	46.34
6/4	.645	74	73	98.65	25	48	114.73	39.29	75.44	34.25
7/1	1.239	407	295	72.48	97	198	328.49	108.01	220.48	32.88
7/2	4.095	747	408	54.62	213	195	182.42	95.23	87.18	52.21
7/3	0	0	0		0	0				
7/4	3.507	1508	533	35.34	171	362	430.00	137.95	292.04	32.08
7/5	1.801	480	259	53.96	33	226	266.52	33.96	232.56	12.74
8/1	1.842	288	187	64.93	18	169	156.35	15.05	141.30	9.63

[a] Catch Per Unit Effort.
[b] Proportion of Nimpkish sockeye within the sample.

TABLE 4 - Weekly Catch, Effort and Stock Determination Data from Test Fishing in Areas 150 and 250, North Shore of Malcolm Island and Broughton Straits, Respectively, in 1982 (See Figure 5).

Week Ending	Minutes Fished (1000's)	Number of Sockeye			Stock		C. P. U. E.[a]			% Nimpkish[b]
		Catch	Sample	%	Nimpkish	Non-Nimpkish	Total	Nimpkish	Non-Nimpkish	
Area 150:										
6/4	.9755	38	36	94.74	9	27	38.95	9.74	29.22	25.00
7/1	.9705	156	141	90.38	17	124	160.74	19.38	141.36	12.06
7/2	.9895	132	112	84.85	22	90	133.40	26.20	107.20	19.64
7/3	.8405	103	91	88.35	12	79	122.35	16.16	106.39	13.19
7/4	.9815	127	72	56.69	5	67	129.39	8.99	120.41	6.94
7/5	.4875	67	64	95.52	0	64	137.44	0	137.44	0
8/1	.7535	227	147	64.76	0	147	301.26	0	301.26	0
Area 250:										
6/4	.7455	172	122	40.93	86	36	230.72	162.64	68.08	70.49
7/1	1.0865	568	156	27.46	78	78	522.78	261.39	261.39	50.00
7/2	1.068	576	204	35.42	75	129	539.33	198.28	341.04	36.76
7/3	.8415	307	162	52.77	92	70	364.82	207.18	157.64	56.79
7/4	1.0385	388	226	58.25	67	159	373.62	110.76	262.85	29.65
7/5	1.5065	137	123	89.78	12	111	90.94	8.87	82.07	9.76
8/1	.7695	142	99	69.72	3	96	184.54	5.59	178.94	3.03

[a] Catch Per Unit Effort.
[b] Proportion of Nimpkish sockeye within the sample.

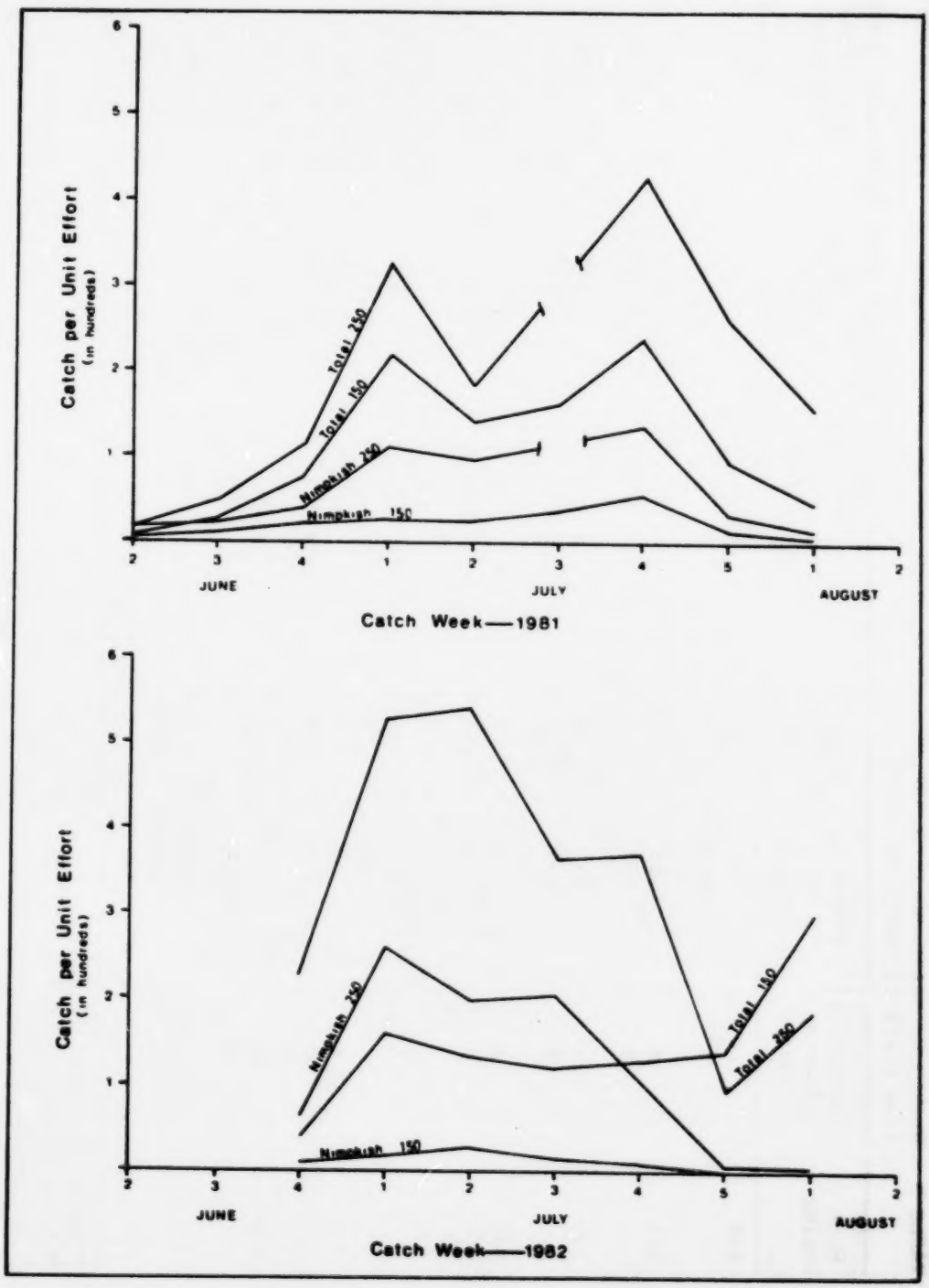

FIGURE 5: Weekly Catch Per Unit Effort for 1981 and 1982 Test Fishing, Compared by Stock and Catch Area.

TABLE 5 - Weekly Calculations of Nimpkish Sockeye Catch in the Area 12 Commercial Fishery in 1981, from Field Estimates of Catch.

Week Ending	Commercial Fishing Area	Number of Sockeye Sampled	Nimpkish Proportion (%)	Estimated Commercial Sockeye Catch	Estimated Nimpkish Catch	Cumulative Nimpkish Catch
6/3	A[a]	132	52.3	1,517	790	790
	B[b]	N/A[c]	-	-	-	-
6/4	A	214	19.2	4,253	817	1,607
	B	143	4.9	1,641	80	1,687
7/1	A	227	9.7	8,175	793	2,480
	B	194	8.8	6,039	531	3,011
7/2	A	0	0	0	0	3,011
	B	191	17.8	11,964	2,130	5,141
7/3	A	0	0	0	0	5,141
	B	260	17.3	10,125	1,752	6,893
7/4	A	0	0	0	0	6,893
	B	606	10.9	85,988	9,373	16,266
7/5	A	105	2.9	95,645	2,771	19,040
	B	222	1.4	161,156	2,256	21,296
8/1	A	N/A	-	-	-	21,296
	B	N/A	-	-	-	21,296

[a] Above Blinkhorn line.
[b] Below Blinkhorn line.
[c] Not Available (not sampled.

TABLE 6 - Weekly Calculations of Nimpkish Sockeye Catch in the Area 12 Commercial Fishery in 1982, from Field Estimates of Catch.

Week Ending	Commercial Fishing Area	Number of Sockeye Sampled	Nimpkish Proportion (%)	Estimated Commercial Sockeye Catch	Estimated Nimpkish Catch	Cumulative Nimpkish Catch
6/3	A[a]	N/A[c]		0	0	0
	B[b]	N/A		0	0	0
6/4	A	N/A		0	0	0
	B	N/A		0	0	0
7/1	A	N/A		0	0	0
	B	N/A		0	0	0
7/2	A	CLOSED		0	0	0
	B	162	0.3	3,177	10	10
7/3	A	CLOSED		0	0	10
	B	207	1.4	6,187	87	97
7/4	A	CLOSED		0	0	97
	B	305	5.6	14,976	839	936
7/5	A	241	5.0	35,895	1,795	2,731
	B	364	2.2	18,279	402	3,133
8/1	A	N/A	0	5,284	N/A	3,133
	B	155	3.9	8,721	340	3,473

[a] Above Blinkhorn line
[b] Below Blinkhorn line

TABLE 7 - Annual Catch, Escapement and Exploitation Rate Data for Nimpkish Sockeye from 1951 to 1982

Spawning Year	Escapement	Catch[a]	Total Stock	% Exploitation[b]
1951	100,000	100,000	200,000	50.0
1952	100,000	107,000	207,000	51.7
1953	100,000	161,000	261,000	61.7
1954	75,000	31,000	106,000	29.2
1955	75,000	48,000	123,000	39.0
1956	75,000	40,000	115,000	34.8
1957	130,000	110,000	240,000	45.8
1958	75,000	55,000	130,000	42.3
1959	75,000	11,000	86,000	12.8
1960	75,000	45,000	120,000	37.5
1961	75,000	70,000	145,000	48.3
1962	100,000	31,000	131,000	23.7
1963	150,000	52,000	202,000	25.7
1964	100,000	125,000	225,000	55.6
1965	30,000	45,000	75,000	60.0
1966	120,000	100,000	220,000	45.5
1967	100,000	60,000	160,000	37.5
1968	35,000	96,000	131,000	73.3
1969	100,000	103,000	203,000	50.7
1970	50,000	60,000	110,000	54.5
1971	75,000	127,000	202,000	62.9
1972	60,000	88,000	148,000	59.5
1973	100,000	55,000	155,000	35.5
1974	150,000	37,000	187,000	19.8
1975	40,000	77,000	117,000	65.8
1976	35,000	66,100	101,100	65.0
1977	15,000	26,300	41,300	63.7
1978	8,500	3,200	11,700	27.4
1979	20,000	13,000	33,000	39.4
1980	24,000	21,550	45,550	47.3
1981	60,000	21,300	81,300	26.2
1982	60,000	3,470	63,470	5.5

[a] See page 10 for catch calculations.
[b] Potential exploitation in areas beyond Area 12 is not considered here.

The estimated commercial catches of Nimpkish River sockeye as calculated from this field program are 21,296 and 3,473 for 1981 and 1982 respectively. It is likely this catch may be underestimated based on outside troll (west coast and Area 11) and northern net (Area 2 west) catches not having been included. Table 7 reviews exploitation rates for Nimpkish River sockeye. Certainly, an exploitation rate of 26.2% for 1981 does not represent a minimum harvest and further closures were implemented for 1982.

3. Age and Length Characteristics

a) Age:
The age structure of Nimpkish and non-Nimpkish sockeye populations are presented in Tables 9 and 10. It shows significant differences between Nimpkish and Non-Nimpkish populations. Although test fishing samples may be biased in that only one net size was used, and age determinations were not made on spawning fish; in all cases Nimpkish sockeye are predominantly 5_2 and non-Nimpkish 4_2. Table 8 estimates the averaged age class structure by weighting the weekly ages by the test fishing C.P.U.E. for Areas 150 and 250 combined:

TABLE 8 - Weighted Age Class Structure of Nimpkish and Non-Nimpkish Populations in 1981 and 1982, from Test Fishing Data* (In Percent)

		4_1	4_2	5_2	5_3	6_3
1981	Nimpkish	0	34.03	65.80	0.17	0
1981	Non-Nimpkish	0.13	90.97	6.54	2.12	.24
1982	Nimpkish	0	10.06	88.33	1.61	0
1982	Non-Nimpkish	0	58.51	37.28	3.66	0.55

*The data is grouped from all fishing locations.

Nimpkish River sockeye in both 1981 and 1982 are largely comprised of 5-year old fish, 65.97% and 89.94%, respectively. Non-Nimpkish stocks, mainly Fraser River stocks, are primarily 4-year old, 90.97% and 58.51% respectively. The less components of age 5_2, 5_3 and 6_3 are likely Study Area stocks returning to Phillips, Heydon and Sakinaw systems (A.D. Anderson, 1974).

With regard to age class structure within the season, the trend, at least for 1981, suggests Nimpkish age 5_2 sockeye predominate early in the season giving way to greater numbers of 4-year old sockeye as the season progresses. The 1982 season does not exhibit a similar pattern, but remains relatively stable throughout. Table 10 outlines the age class structure of the commercial samples taken in 1981 and 1982.

TABLE 9 - Ages of Nimpkish and Non-Nimpkish Sockeye Sampled from Test Catches and Summarized by Week.

Week Ending	Sample Size	Age 4_2	%	Age 5_2	%	Age 5_3	%
	Nimpkish - 1981						
6/2	21	7	33.33	13	61.90	1	4.76
6/3	49	7	14.29	42	85.71	0	0
6/4	59	12	20.34	47	79.66	0	0
7/1	154	55	35.71	99	64.29	0	0
7/2	280	105	37.50	175	62.50	0	0
7/3	90	40	44.44	50	55.56	0	0
7/4	226	67	29.65	159	70.35	0	0
7/5	103	42	40.78	61	59.22	0	0
8/1	26	12	46.15	14	53.85	0	0
	Nimpkish - 1982						
6/2	0	0	0	0	0	0	0
6/3	0	0	0	0	0	0	0
6/4	70	4	5.71	66	94.29	0	0
7/1	96	15	15.63	77	80.21	4	4.17
7/2	99	10	10.10	86	86.87	3	3.03
7/3	104	16	15.38	87	83.65	1	0.96
7/4	72	10	13.89	62	86.11	0	0
7/5	12	0	0	12	100.00	0	0
8/1	3	0	0	3	100.00	0	0

Week Ending	Sample Size	Age 4_1	%	Age 4_2	%	Age 5_2	%	Age 5_3	%	Age 6_3	%
	Non-Nimpkish - 1981										
6/2	1	0	0	0	0	1	100.00	0	0	0	0
6/3	58	3	5.17	46	79.31	4	6.90	5	8.62	0	0
6/4	173	1	0.58	135	78.61	16	9.25	19	10.98	1	0.58
7/1	443	0	0	405	91.42	34	7.67	4	0.90	0	0
7/2	508	0	0	482	94.88	15	2.95	10	1.97	1	0.20
7/3	236	0	0	206	87.29	19	8.05	9	3.81	2	0.85
7/4	515	0	0	479	93.01	34	6.60	2	0.39	0	0
7/5	569	0	0	540	94.90	22	3.87	6	1.05	1	0.18
8/1	204	0	0	194	95.10	9	4.41	0	0	1	0.49
	Non-Nimpkish - 1982										
6/2	0	0	0	0	0	0	0	0	0	0	0
6/3	0	0	0	0	0	0	0	0	0	0	0
6/4	63	0	0	32	50.79	24	38.10	7	11.11	0	0
7/1	208	0	0	111	53.37	79	37.98	16	7.69	2	0.96
7/2	217	0	0	112	51.61	95	43.79	8	3.69	2	0.92
7/3	149	0	0	69	46.31	80	53.69	0	0	0	0
7/4	226	0	0	121	53.34	100	44.25	3	1.33	2	0.88
7/5	173	0	0	136	78.61	37	21.39	0	0	0	0
8/1	244	0	0	214	87.70	26	10.66	4	1.64	0	0

TABLE 10 - Ages of Nimpkish Sockeye Sampled From the Area 12 Commercial Fishery in 1981 and 1982 and Summarized by Week

Week Ending	1981 Total Sample Size[a]	1981 Nimpkish Sample Size	1981[c] 4_2	1981[c] 5_2	1982 Total Sample Size[a]	1982 Nimpkish Sample Size	1982[c] 4_2	1982[c] 5_2
6/3	132	69	24	45	closed			
6/4	357	88	13	35	closed			
7/1	421	39	12	27	closed			
7/2	148	34	16	18	156	4	1	3
7/3	203	45	21	24	271	3	1	2
7/4	535	39	26	13	290	17	11	6
7/5	304	6	4	2	604	19	12	7
8/1	N/A[d]				154	6	4	2
8/2	N/A[d]				269	0	0	0

[a] The data are amalgamated to represent all catch areas on a weekly basis.

[b] Closed to commercial fishing.

[c] Very limited numbers of Nimpkish sockeye were found to be in the 4_1, 5_3 and 6_3 age classes and have not been recorded here.

[d] N/A - not sampled during that period.

b) Lengths:

Fork length and postorbital-hypural plate length measurements were taken from all test fishing samples. Tables 11, 12 and 13 present this data for Nimpkish sockeye only. Appendix IV provides additional details of the length structure separating the stocks by age.

Table 11 provides length frequencies for fork and postorbital hypural lengths for 1981 and 1982. All age classes are grouped. Correlations between postorbital-hypural (P.O.H.) and fork lengths (F.L.) are described in Table 12 for potential conversions.

TABLE 11 - Length Frequency Statistics for Nimpkish Sockeye, All Ages Grouped.

	1981 Nimpkish	1982 Nimpkish
POH Sample Size	1008	456
Mean	48.4	49.1
St. Error	0.1	0.1
Maximum	59.0	57.0
Minimum	23.0	42.2
Variance	10.2	5.3
Standard Deviation	3.2	2.3
Fork Sample Size	806	456
Mean	58.9	60.2
St. Error	0.1	0.1
Maximum	72.0	71.4
Minimum	45.0	48.9
Variance	15.2	8.9
Standard Deviation	3.9	3.0

TABLE 12 - Correlation Statistics for Length Frequencies of Nimpkish Sockeye, All Ages Grouped.

Sample	Mean	Stan. Dev.	Regression Line	N	Corr. Coeff. (R^2)
1981					
P.O.H.	48.33	3.22	x = 0.72y + 5.98	907	0.76
Fork Length	58.90	3.89			
1982					
P.O.H.	49.1	2.29	x = 0.70y + 6.7	456	0.91
Fork Length	60.2	2.97			

Nimpkish sockeye length frequencies, grouped by age class, are presented in Table 13. The data suggests there are no significant differences in length between 4 and 5-year old fish that might allow field separation without other stock discrimination analysis techniques. As noted above, however, the age and length samples from the test fishery catches may be biased due to the uniform size of the gillnets used.

TABLE 13 - Length Statistics for Nimpkish Test Caught Sockeye, Separated by Age (P.O.H. Lengths).

		1981	1982
4_2	Sample Size	347	55
	Mean Length	46.0	46.2
	Standard Deviation	4.95	.04
	Standard Error	.12	.22
5_2	Sample Size	659	393
	Mean Length	49.71	49.50
	Standard Deviation	7.22	.04
	Standard Error	.10	.10

SUMMARY

The 1981 and 1982 Nimpkish sockeye test fishing programs had two primary objectives. The first objective was to evaluate the Department of Fisheries and Oceans' area and timing closures to minimize the exploitation rate of Nimpkish sockeye. The other objective was to determine a methodology for in-season management of Nimpkish sockeye on a real-time basis with regard to abundance and approach.

The program results indicated that Nimpkish sockeye do exhibit clear differences in migration route and population age structure, and possibly migration timing from other sockeye stocks. Nimpkish sockeye approach the estuary primarily via Broughton Strait. Their timing is relatively earlier than the balance of Area 12 sockeye, composed mainly of Fraser River and mainland inlet stocks, but definite run timing for 1981 and 1982 were obscured by adjacent commercial fishing openings and an incomplete commercial sampling program.

The population age structure was primarily five year old sockeye in 1981 and 1982, although there is likely significant shifts in age structure. Nimpkish sockeye age classes could not be separated from length data alone.

The most important aspect of this program was the review of the area and timing closures in place during 1981 for reducing the Nimpkish sockeye harvests. The first year of the program illustrated that such closures were inadequate to effectively minimize exploitation. Changes in area and timing closures in 1982 reduced the harvest rate of Nimpkish River sockeye in the Johnstone Strait net fishery from over 25% to less than 10% (field estimates only). The program developed a general method for separation and evaluation of Nimpkish River sockeye approaches and timings, however, further refinements are required to make the method an effective in-season management tool.

ACKNOWLEDGEMENTS

We would like to thank our two 1981 test boat skippers, Barry Palo and Risto Suni, as well as our sampling crew of Graham Edwards, Bruce Jeffs and Dean Suni. A special thanks must go to Brenda Wishart, who ably provided all our field scale readings, to Yvonne Yole for help and expertise throughout the program and writeup, and to Don Bailey for providing the Scale Lab staff.

In 1982, our thanks extend to skippers Ken Jolliffe and Doug Melan, and to their respective onboard samplers, Richard Jolliffe and Leah Justus. Diane Gillies provided excellent field scale reading services and Yvonne and Don again provided their support and expertise during this program.

Alvin Sewid organized and collected our commercial scale data, throughout the program.

This report was edited by Judy E. Barnetson and word processing was provided by Valerie Rogers.

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APPENDIX 1
1981 Commercial Fishery Pattern for Area 12

W.E. June 20 - Nets

1. SN: 6 p.m. Sunday, June 14 to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday, June 14 to 6 a.m. Wednesday.

3. Mainland Inlets closed.

4. i) Upper Goletas Channel closed inside a line from a boundary sign on Cape Sutil, Vancouver Island in a straight line to Mexicana Point on Hope Island, then following the south shore of Hope Island to a boundary sign on Heath Point, then to a boundary sign on the most westerly point on Nigel Island, then across to Halsted Inlet, Vancouver Island.

   ii) Lower Goletas Channel closed inside a line from Mier Point, Vancouver Island in a strait line to Doyle Island light, then in a straight line to Dillon Point.

   iii) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of west Cracroft Island.

   iv) Parsons Bay closed (to September 15th).

   v) Nimpkish stream boundary closed by Ledge Point, Haddington Island Boundary.

W.E. June 27 - Nets

1. SN: 6 p.m. Sunday, June 21 to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday, June 21 to 6 a.m. Wednesday.

3. Mainland Inlets closed.

4. i) Upper Goletas Channel closed inside a line from a boundary sign on Cape Sutil, Vancouver Island in a straight line to Mexicana Point on Hope Island then following the south shore of Hope Island to a boundary sign on Heath Point, then to a boundary sign on the most westerly point on Nigel Island, then across to Halsted Islet, Vancouver Island.

APPENDIX I (continued)

ii) Lower Goletas Channel closed inside a line from Mier Point, Vancouver Island in a straight line to Dillon Point.

iii) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of west Cracroft Island.

iv) Parsons Bay closed (to September 15th).

5. i) Extended Nimpkish boundary in effect from False Head on Vancouver Island to Pultney Point on Malcolm Island, then following the south slope of Malcolm Island to Donegal Head, then to Blinkhorn light on Vancouver Island.

ii) That portion of Area 12 lying north and west of a line from Blinkhorn light on Vancouver Island to Donegal Head on Malcolm Island to Bold Head on Swanson Island then to Growler Point on Broughton Island.

iii) That portion of Area 12 lying south and east of a line from Boyles Point near the entrance to Wells Passage on the mainland and then to Malcolm Point on Malcolm Island.

W.E. July 4 - Nets

1. SN: 6 p.m. Sunday, June 28 to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday, June 28 to 6 a.m. Wednesday.

3. Mainland Inlets closed.

4. i) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of west Cracroft Island.

ii) Parsons Bay closed (September 15th).

iii) Area closed north of Malcolm Point to Boyles Point.

W.E. July 11 - Nets

1. SN: 6 p.m. Sunday, July 5 to 6 p.m. Wednesday.

2. GN: 6 p.m. Sunday, July 5 to 6 p.m. Thursday.

3. Mainland Inlets closed.

APPENDIX I (continued)

4. i) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of Cracroft Island.

   ii) Parsons Bay closed (to September 15th).

5. i) Extended Nimpkish boundary in effect from False Head on Vancouver Island to Pultney Point on Malcolm Island, then following the south shore of Malcolm Island to Donegal Island.

   ii) Waters north of Blinkhorn Peninsula light to boundary sign on Hanson Island opposite, then along the south shore of Hanson Island to a boundary at the southeast point on Hanson Island to Cracroft Point light remains closed.

6. Adam River box boundary in effect. Upper boundary: Escape Reef on west Cracroft Island to a boundary sign on Vancouver Island opposite. Lower boundary: Stimpson Point on Mainland to boundary sign opposite on Vancouver Island.

<u>W.E. July 18 - Nets</u>

1. SN: 6 p.m. Sunday, July 12 to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday, July 12 to 6 a.m. Wednesday.

3. Mainland Inlets closed.

4. i) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of west Cracroft Island.

   ii) Parsons Bay closed (to September 15th).

5. i) Extended Nimpkish boundary in effect from False Head on Vancouver Island to Pultney Point on Malcolm Island, then following the south shore of Malcolm Island to Donegal Head, then to Blinkhorn light on Vancouver Island.

   ii) Waters north of Blinkhorn Light to boundary sign on Hanson Island opposite, then along the south shore of Hanson Island to a boundary at the southeast point on Hanson Island to Cracroft Point light remains closed.

APPENDIX I (continued)

6. Adam River box boundary in effect. Upper boundary: Escape Reef on west Cracroft Island to boundary sign on Vancouver Island opposite. Lower boundary: Stimpson Point on the mainland to boundary sign opposite on Vancouver Island.

W.E. July 25 - Nets

1. SN: 6 p.m. Sunday, July 19 to 6 p.m. Wednesday.

2. GN: 6 p.m. Sunday, July 19 to 6 a.m. Thursday.

3. Mainland Inlets closed.

4. i) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of west Cracroft Island.

   ii) Parsons Bay closed (to September 15th).

5. i) Extended Nimpkish boundary in effect from False Head on Vancouver Island to Pultney Point on Malcolm Island, then following the south shore of Malcolm Island to Donegal Head, then to Blinkhorn light on Vancouver Island.

   ii) Waters north of Blinkhorn light to boundary sign on Hanson Island opposite, then along the south shore of Hanson Island to a boundary at the southeast point on Hanson Island to Cracroft Point Light remains closed.

6. Adam River box boundary in effect. Upper boundary: Escape Reef on west Cracroft Island to boundary sign on Vancouver Island opposite. Lower boundary: Stimpson Point on the mainland to boundary sign opposite on Vancouver Island.

W.E. August 1 - Nets

1. SN: 6 p.m. Sunday, July 26 to 6 p.m. Wednesday.

2. GN: 6 p.m. Sunday, July 26 to 6 p.m. Thursday.

3. Mainland Inlets closed.

4. i) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of west Cracroft Island.

   ii) Parsons Bay closed (to September 15th).

APPENDIX I (continued)

5. i) Extended Nimpkish boundary in effect from False Head on Vancouver Island to Pultney Point on Malcolm Island, then following the south shore of Malcolm Island to Donegal Head, then to Blinkhorn light on Vancouver Island.

   ii) Queen Charlotte Straits closed north and west from Bowler Point to Staples Islet to Echo Island to Stuart Point.

   iii) Waters north of Lewis Point to Donegal Head to a boundary sign on the south side of Swanson Island near Freshwater Bay to Red Point remains closed.

6. Adam River box boundary in effect. Upper boundary: Escape Reef on west Cracroft Island to boundary sign on Vancouver Island opposite. Lower boundary: Stimpson Point on the mainland to boundary sign opposite on Vancouver Island.

W.E. August 8 - Nets

1. SN: 6 a.m. Monday, August 3 to 2 p.m. Wednesday.

2. GN: 6 p.m. Sunday, August 3 to 2 p.m. Thursday.

3. Mainland Inlets closed.

4. The waters of Growler Cove inside a line between two boundary signs on the southwest shore of west Cracroft Island.

5. i) Extended Nimpkish boundary in effect from False Head on Vancouver Island to Pultney Point on Malcolm Island, then following the south shore of Malcolm Island to Donegal Head, then to Blinkhorn light on Vancouver Island.

   ii) Waters north of Lewis Point to Donegal Head to a boundary sign on the south side of Swanson Island near Freshwater Bay to Red Point remains closed.

6. Adam River box boundary in effect. Upper boundary: Escape Reef on west Cracroft Island to boundary sign on Vancouver Island opposite. Lower boundary: Stimpson Point on the mainland to boundary sign opposite on Vancouver Island.

7. i) Open to SN and GN north and west of Bowler Point to Staples Islets to Echo Island to Doyle Island light to Dillon Point.

   ii) Open to SN inside a line extending ½ mile seaward from Lewis Point towards Stephenson Islets, then in a

APPENDIX I (continued)

southerly direction ½ mile offshore of Vancouver Island to Suffolk Point on East Thurlow Island.

iii) Open to GN in Johnstone Straits south of a line from Lewis Point to Stephenson Islets to the most southwesterly point of Hanson Island and north of a line from Chatham Point to Suffolk Point. Blackney Pass remains closed by a line from a boundary sign on the southern entrance of Parsons Bay.

APPENDIX II
1982 Commercial Fishery Pattern for Area 12

W.E. July 10 - Nets

1. SN: 6 p.m. Sunday to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday to 6 a.m. Wednesday.
   *Sub-areas 12-2, 12-6, 12-29 and 12-30 open.

3. i) Mainland Inlets closed to all gear. Mainland inlet boundaries are: Boyles Point to Growler Point to Success Point to Bare Hill, due south to West Cracroft island, then along shore to the entrance to Port Hardy to Domville Point to Neville Point to Ransome Point - Normal stream boundaries in effect.

   ii) The waters of Growler Cove inside a line between two boundary signs on the south shore of West Cracroft Island.

4. All Area 12 closed north and west of Lewis Point to boundary sign on Hanson Island opposite, then along the south shore of Hanson Island to a boundary at the south east point on Hanson Island to Cracroft Island.

5. Adam River box boundary in effect. Upper boundary: Escape Reef on West Cracroft Island to boundary sign on Vancouver Island opposite. Lower boundary: Stimpson Point on the mainland to boundary sign on Vancouver Island opposite.

W.E. July 17 - Nets

1. SN: 6 p.m. Sunday to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday to 6 a.m. Wednesday.
   *Sub-areas 12-2, 12-6, 12-29 and 12-30 open.

3. Mainland inlets closed.

4. Growler Cove and Parsons Bay closed.

5. All Area 12 closed north and west of Lewis Point to boundary sign on Hanson Island opposite, then along the south shore of Hanson Island to a boundary at the south east point on Hanson Island to Cracroft Island.

6. Adam River box boundary in effect. Upper boundary: Escape Reef on West Cracroft Island to boundary sign on Vancouver Island opposite. Lower boundary: Stimpson Point on the mainland to boundary sign on Vancouver Island opposite.

APPENDIX II - (continued)

W.E. July 24 - Nets

1. SN: 6 p.m. Sunday to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday to 6 a.m. Wednesday.
   *Sub-areas 12-2, 12-6, 12-29 and 12-30 open.

3. Mainland Inlets closed.

4. Growler Cove and Parsons Bay closed.

5. Area closed north of Lewis Point to boundary sign on Hanson Island opposite, then along the south shore of Hanson Island to a boundary at the southeast point on Hanson Island to Cracroft Point.

*Sub-areas 12-2, 12-6, 12-29 and 12-30 encompass those waters of Johnstone Strait bounded on the north by a line from Blinkhorn Peninsula to the most westerly point on Hanson Island, and on the south by a line from Tuna Point on the mainland true south to the shore of Vancouver Island, but excluding those waters of Johnstone Strait of the mouth of the Adam River bounded on the east by a line from Stimpson Point on the mainland to a point on Vancouver Island opposite, marked by a fishing boundary sign, and on the west by a line true north from Vancouver Island through Escape Reef, to West Cracroft Island (B.C. Fishing Regulations).

W.E. July 31 - Nets

1. SN: 6 p.m. Sunday to 6 p.m. Tuesday.

2. GN: 6 p.m. Sunday to 6 a.m. Wednesday.
   *Sub-areas 12-2, 12-6, 12-17, 12-22, 12-23, 12-24, 12-28, 12-29 and 12-30 open.

3. Mainland Inlets closed.

4. i) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of West Cracroft Island.

   ii) Parsons Bay closed.

APPENDIX II - (continued)

5. All portions of Area 12 lying north and west of a line from Blinkhorn light on Vancouver Island to boundary sign on Hanson Island opposite, then along the south shore of Hanson Island to a boundary at the south east point on Hanson Island to Cracroft Point light closed, except those northern portions of Area 12 lying within a line from Pultney Point on Malcolm Island, across to False Head on Vancouver Island, then across to Doyle Island light, a southern tip of Gordon group, then across to Echo light to Numas Island and over to Boulder Point on Malcolm Island.

6. Adams River box boundary in effect. Upper boundary: Escape Reef on West Cracroft Island to boundary sign on Vancouver Island opposite. Lower Boundary: Stimpson Pont on the mainland to boundary sign on Vancouver Island opposite.

7. Seines will be prohibited from fishing within ½ mile of the mainland shore to provide a corridor to Study Area pink stocks.

APPENDIX II - (continued)

5. i) Lower Goletas Channel closed inside a line from False Head on Vancouver Island in a straight line to Doyle Island light in a straight line to Boyles Point on Lower point of Nigel Island, then directly across to Vancouver Island.

   ii) Upper Goletas Channel closed inside a line from a boundary sign on Cape Sutil, Vancouver Island in a straight line to Mexicana Point on Hope Island.

6. i) Extended Nimpkish boundary in effect from False Head on Vancouver Island to Pultney Point on Malcolm Island, then following the south shore of Malcolm Island to Donegal Head, boundary sign on north west tip of Hanson island, then to Lewis Point on Vancouver Island.

   ii) Queen Charlotte Straits closed north and west from Boulder Point to Staples Islet to Echo Island to Stuart Point on the mainland.

   iii) That portion of Area 12 lying north and west of a line from Donegal Head on Malcolm Island to Bold Head on Malcolm Island to Bold Head on Swanson Island to Red Point on Harbledown Island.

7. Adams River box boundary in effect. Upper boundary: Escape Reef on West Cracroft island to boundary sign on Vancouver Island opposite. Lower Boundary: Stimpson Pont on the mainland to boundary sign on Vancouver Island opposite.

<u>W.E. August 7 - Nets</u>

1. SN: 6 p.m. Sunday to 6 p.m. Monday.

2. GN: 6 p.m. Sunday to 6 a.m. Tuesday.
   *Sub-areas 12-17, 12-30, 12-6 and 12-2 open.

3. Mainland Inlets closed.

4. i) The waters of Growler Cove inside a line between two boundary signs on the southwest shore of West Cracroft Island.

   ii) Parsons Bay closed.

APPENDIX III

Daily Test Fishing Data for 1981 and 1982

APPENDIX TABLES III - a, b, c, d, e: Daily Catch, Effort and Stock Determination Data, by Area.

APPENDIX TABLES III - f, g, h: Daily Catch and Effort Statistics, for all Salmon Species, by Area (for 1981 only)

APPENDIX TABLE III-a: Daily Catch, Effort and Stock Determination Data from Test Fishing in Area 150, North Shore of Malcolm Island in 1981.

Date	Minutes Fished (1000's)	Number of Sockeye			Stock		C. P. U. E.[a]			% Nimpkish[b]
		Catch	Sample	%	Nimpkish	Non-Nimpkish	Total	Nimpkish	Non-Nimpkish	
June										
10	.337	5	3	60.00	2	1	14.84	9.89	4.95	66.67
11	.595	3	2	66.67	2	0	5.04	5.04	0	100.00
17	.835	16	14	87.50	9	5	19.16	12.32	6.84	64.29
19	.766	28	28	100.00	9	19	36.55	11.75	24.80	32.14
20	.466	5	5	100.00	1	4	10.73	2.15	8.58	20.00
24	.880	64	59	92.19	16	43	72.73	19.72	53.00	27.12
25	.475	34	32	94.12	9	23	71.58	20.13	51.45	28.12
28	.461	15	12	80.00	2	10	32.54	5.42	27.11	16.67
July										
1	.235	195	67	34.36	9	58	829.79	111.46	718.32	13.43
2	.425	24	24	100.00	5	19	56.47	11.76	44.71	20.83
3	.580	137	88	64.23	5	83	236.21	13.42	222.79	5.68
5	.780	190	144	75.79	24	120	243.59	40.60	202.99	16.67
6	1.076	108	78	72.22	6	72	100.37	7.72	92.65	7.69
7	.871	99	88	88.89	19	69	113.66	24.54	89.12	21.59
8	.605	70	63	90.00	15	48	115.70	27.55	88.15	23.81
12	.580	86	81	94.19	18	63	148.28	32.95	115.33	22.22
13	.345	100	88	88.00	9	79	183.49	18.77	164.72	10.23
14	.420	54	35	64.81	13	22	128.57	47.76	80.82	37.14
15	.792	127	79	62.20	23	56	160.35	46.69	113.67	29.11
18	.830	147	127	86.39	32	95	177.11	44.63	132.48	25.20
19	.846	234	78	33.33	17	61	276.60	60.28	216.31	21.79
20	.902	168	113	67.26	29	84	186.25	47.80	138.45	25.66
21	.586	155	54	34.84	13	41	264.51	63.68	200.83	24.07
25	.871	218	110	50.46	15	95	250.29	34.13	216.16	13.64
26	.614	90	57	63.33	12	45	146.58	30.86	115.72	21.05
27	.769	53	51	96.23	6	45	68.92	8.11	60.81	11.76
28	.362	30	29	96.67	1	28	82.87	2.86	80.02	3.45
August										
3	.835	19	18	94.74	3	15	22.75	3.79	18.96	16.67
4	.532	45	25	55.56	3	22	84.59	10.15	74.44	12.00

[a] Catch Per Unit Effort
[b] Proportion of Nimpkish sockeye within the sample

APPENDIX TABLE III-b: Daily Catch, Effort and Stock Determination Data from Test Fishing in Area 250, Broughton Straits, in 1981.

Date	Minutes Fished (1000's)	Number of Sockeye			Stock		C. P. U. E.[a]			% Nimpkish[b]
		Catch	Sample	%	Nimpkish	Non-Nimpkish	Total	Nimpkish	Non-Nimpkish	
June										
10	.340	3	3	100.00	3	0	8.82	8.82	0	100.00
11	.637	16	14	87.50	14	0	25.12	25.12	0	100.00
17	.175	4	4	100.00	3	1	22.86	17.14	5.71	75.00
18	.472	37	35	94.59	16	19	78.39	35.84	42.55	45.71
20	.290	2	2	100.00	0	2	6.90	0	6.90	0
27	.645	74	73	98.65	25	48	114.73	39.29	75.44	34.25
July										
1	.754	275	175	63.64	58	117	364.72	120.88	243.84	33.14
2	.485	132	120	90.91	39	81	272.16	88.45	183.71	32.50
5	.995	182	96	52.75	48	48	182.91	91.46	91.46	50.00
6	1.110	168	121	72.02	43	78	151.35	53.79	97.57	35.54
7	1.260	277	96	34.66	53	43	219.84	121.37	98.47	55.21
8	.730	120	95	79.17	69	26	164.38	119.39	44.99	72.63
19	1.030	451	92	20.40	41	51	437.86	195.14	242.73	44.57
20	.899	401	184	45.89	64	120	446.05	155.15	290.90	34.78
21	.785	270	91	33.70	32	59	343.95	120.95	223.00	35.16
25	.793	386	166	43.01	34	132	486.76	99.70	387.06	20.48
26	.710	222	85	38.29	22	63	312.68	80.93	231.75	25.88
27	.583	90	81	90.00	9	72	154.37	17.15	137.22	11.11
28	.508	168	93	55.36	2	91	330.71	7.11	323.60	2.15
August										
2	.705	100	48	48.00	2	46	141.84	5.91	135.93	4.17
3	.748	167	119	71.26	13	106	223.26	24.39	198.87	10.92
4	.389	21	20	95.24	3	17	53.98	8.10	45.89	15.00

[a] C atch P er U nit E ffort
[b] Proportion of Nimpkish sockeye within the sample

APPENDIX TABLE III-c: Daily Catch, Effort and Stock Determination Data from Test Fishing in Areas 350 and 450, Hanson Island/Double Bay and Goletus Channel, respectively, in 1981.

Date	Minutes Fished (1000's)	Number of Sockeye			Stock		C. P. U. E.[a]			% Nimpkish[b]
		Catch	Sample	%	Nimpkish	Non-Nimpkish	Total	Nimpkish	Non-Nimpkish	
Area 350:										
June										
25	.597	35	34	97.14	3	31	58.63	5.17	53.45	8.82
26	.386	49	47	95.92	12	35	126.94	32.41	94.53	25.53
27	.379	21	19	90.48	8	11	55.41	23.33	32.08	42.11
July										
1	.255	27	27	100.00	1	26	105.88	3.92	101.96	3.70
2	.165	3	3	100.00	0	3	18.18	0	18.18	0
6	.190	5	5	100.00	1	4	26.32	5.26	21.05	20.00
12	.909	60	54	90.00	9	45	66.01	11.00	55.01	16.67
13	.391	30	28	93.33	6	22	76.73	16.44	60.28	21.43
14	.352	53	50	94.34	20	30	150.57	60.23	90.34	40.00
Area 450:										
July										
17	.470	12	12	100.00	4	8	25.53	8.51	17.02	33.33
19	.895	14	14	100.00	3	11	15.64	3.35	12.29	21.43
20	.235	1	1	100.00	0	1	4.26	0	4.26	0
August										
2	.580	10	9	90.00	4	5	17.24	7.66	9.58	44.44
3	.770	23	23	100.00	8	15	29.87	10.39	19.48	34.78
4	.580	22	20	90.91	6	14	37.93	11.38	26.55	30.00

[a] Catch Per Unit Effort
[b] Proportion of Nimpkish sockeye within the sample

APPENDIX TABLE III-d: Daily Catch, Effort and Stock Determination Data from Test Fishing in Area 150, North Shore of Malcolm Island, in 1982.

Date	Minutes Fished (1000's)	Number of Sockeye			Stock		C. P. U. E.[a]			% Nimpkish[b]
		Catch	Sample	%	Nimpkish	Non-Nimpkish	Total	Nimpkish	Non-Nimpkish	
June										
21	.507	17	16	94.12	7	9	33.56	14.68	18.88	43.75
22	.241	6	6	100.00	0	6	24.90	0	24.90	0
23	.228	15	14	93.33	2	12	65.79	9.40	56.39	14.29
27	.243	49	40	81.63	3	37	201.65	15.12	186.52	7.50
28	.242	41	39	95.12	9	30	169.42	39.10	130.32	23.08
29	.241	35	32	91.43	3	29	145.23	13.62	131.61	9.38
30	.245	31	30	96.77	2	28	126.79	8.45	118.34	6.67
July										
5	.258	65	48	73.85	11	37	251.94	57.74	194.20	22.92
6	.248	19	17	89.47	3	14	76.61	13.52	63.09	17.65
7	.252	18	17	94.44	2	15	71.57	8.42	63.15	11.76
8	.232	30	30	100.00	6	24	129.31	25.86	103.45	20.00
11	.25	24	23	95.83	0	23	96.00	0	96.00	0
12	.259	42	33	78.57	2	31	162.48	9.85	152.63	6.06
13	.245	20	19	95.00	8	11	81.80	34.44	47.36	42.11
14	.088	17	16	94.12	2	14	194.29	24.29	170.00	12.50
18	.243	21	20	95.24	0	20	86.60	0	86.60	0
19	.248	36	24	66.67	2	22	145.45	12.12	133.33	8.33
20	.249	56	14	25.00	3	11	224.90	48.19	176.71	21.43
21	.243	14	14	100.0	0	14	57.73	0	57.73	0
27	.245	34	33	97.06	0	33	138.78	0	138.78	0
28	.243	33	31	93.94	0	31	136.08	0	136.08	0
August										
1	.261	108	65	60.19	0	65	413.79	0	413.79	0
2	.2425	82	48	58.54	0	48	338.14	0	338.14	0
3	.250	37	34	91.89	0	34	148.00	0	148.00	0

[a] Catch Per Unit Effort
[b] Proportion of Nimpkish sockeye within the sample

APPENDIX TABLE III-e: Daily Catch, Effort and Stock Determination Data from Test Fishing in Area 250, Broughton Straits, in 1982.

Date	Minutes Fished (1000's)	Number of Sockeye			Stock		C. P. U. E.[a]			
		Catch	Sample	%	Nimpkish	Non-Nimpkish	Total	Nimpkish	Non-Nimpkish	% Nimpkish[b]
June										
20	.262	14	12	85.71	6	6	57.97	28.99	28.99	50.00
22	.238	71	47	66.20	38	9	298.32	241.19	57.12	80.85
23	.266	87	63	72.41	42	21	327.07	218.03	109.02	66.67
27	.257	177	24	13.56	15	9	690.06	431.29	258.77	62.50
28	.259	130	44	33.85	18	26	502.90	205.73	297.17	40.91
29	.307	163	46	28.22	24	22	531.81	277.34	254.34	52.17
30	.265	98	42	42.86	21	21	369.81	184.91	184.91	50.00
July										
5	.265	122	48	39.34	27	21	476.56	268.07	208.50	56.25
6	.253	123	43	34.96	11	32	487.13	124.61	362.51	25.58
7	.286	152	47	30.92	22	25	531.47	248.77	282.70	46.81
8	.274	179	66	36.87	15	51	654.48	148.75	505.73	22.73
11	.251	90	40	44.44	18	22	359.28	161.68	197.60	45.00
12	.271	134	47	35.07	28	19	494.46	294.57	199.89	59.57
13	.257	69	62	89.86	35	27	269.01	151.86	117.15	56.45
14	.064	14	13	92.86	11	2	220.47	186.55	33.92	84.62
18	.284	123	63	51.22	17	46	433.86	117.07	316.79	26.98
19	.241	95	74	77.89	26	48	395.01	138.79	256.22	35.14
20	.258	92	46	50.00	17	29	357.28	132.04	225.24	36.96
21	.257	78	43	55.13	7	36	303.50	49.41	254.09	16.28
25	.505	12	12	100.00	3	9	23.79	5.95	17.84	25.00
26	.481	40	35	87.50	2	33	83.25	4.76	78.49	5.71
27	.263	42	38	90.48	7	31	159.70	29.42	130.28	18.42
28	.259	43	38	88.37	0	38	166.34	0	166.34	0
August										
1	.268	64	44	68.75	1	43	258.59	5.88	252.71	2.27
2	.258	31	21	67.74	0	21	120.39	0	120.39	0
3	.265	47	34	72.34	2	32	177.69	10.45	167.24	5.88

[a] Catch Per Unit Effort
[b] Proportion of Nimpkish sockeye within the sample

APPENDIX TABLE III-f: Test Fishing Catch and Effort Statistics for all Salmon Species in Area 150, North Shore of Malcolm Island, in 1981.

Date	Minutes Fished (1000's)	CATCH					C. P. U. E.[a]				
		Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum	Chinook
June											
10	.377	5	0	0	0	0	13.26	0	0	0	0
11	.595	3	0	0	0	0	5.04	0	0	0	0
17	.835	16	0	0	0	2	19.16	0	0	0	2.40
19	.766	28	0	0	0	0	36.55	0	0	0	0.00
20	.466	5	0	0	0	1	10.73	0	0	0	2.15
24	.88	64	1	0	0	4	72.73	1.14	0	0	4.55
25	.475	34	0	0	0	0	71.58	0	0	0	0.00
28	.461	15	0	0	0	0	32.54	0	0	0	0
July											
1	.235	195	0	5	0	1	829.79	0	21.28	0	4.26
2	.425	24	0	1	0	0	56.47	0	2.35	0	0
3	.58	137	2	4	0	0	236.21	3.45	6.90	0	0
5	.78	190	2	15	1	0	243.59	2.56	19.23	1.28	0
6	1.076	108	5	3	1	2	100.37	4.65	2.79	0.93	1.86
7	.871	99	3	13	1	3	113.66	3.44	14.93	1.15	3.44
8	.605	70	1	1	0	0	115.70	1.65	1.65	0	0
12	.58	86	1	13	3	1	148.28	1.72	22.41	5.17	1.72
13	.545	100	1	16	0	1	183.49	1.83	29.36	0	1.83
14	.42	54	1	8	0	0	128.57	2.38	19.05	0	0
15	.792	127	0	0	3	0	160.35	0	0	3.79	0
18	.83	147	4	11	1	1	177.11	4.82	13.25	1.20	1.20
19	.846	234	7	46	1	1	276.60	8.27	54.37	1.18	1.18
20	.902	168	2	30	3	1	186.25	2.22	33.26	3.33	1.11
21	.586	155	9	66	8	1	264.51	15.36	112.63	13.65	1.71
25	.871	218	1	57	4	0	250.29	1.15	65.44	4.59	0
26	.614	90	1	83	2	0	146.58	1.63	135.18	3.26	0
27	.769	53	3	63	2	0	68.92	3.90	81.92	2.60	0
28	.362	30	2	57	2	0	82.87	5.52	157.46	5.52	0
August											
3	.835	19	2	14	1	1	22.75	2.40	16.77	1.20	1.20
4	.532	45	1	0	2	0	84.59	1.88	0	3.76	0

[a] Catch Per Unit Effort.

APPENDIX TABLE III-g: Test Fishing Catch and Effort Statistics for all Salmon Species in Area 250, Broughton Straits, in 1981

Date	Minutes Fished (1000's)	CATCH					C. P. U. E.[a]				
		Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum	Chinook
June											
10	.340	0	0	0	0	0	8.82	0	0	0	0
11	.637	16	0	0	0	0	25.12	0	0	0	0
17	.175	4	0	0	0	0	22.86	0	0	0	0
18	.472	37	0	0	0	0	78.39	0	0	0	0
20	.290	2	0	0	0	0	6.90	0	0	0	0
27	.645	74	0	0	0	0	114.73	0	0	0	0
July											
1	.754	275	1	8	0	0	364.72	1.33	10.61	0	0
2	.485	132	0	0	0	0	272.16	0	0	0	0
5	.995	182	2	3	0	3	182.91	2.01	3.02	0	3.02
6	1.110	168	3	3	0	0	151.35	2.70	2.70	0	0
7	1.260	277	1	4	0	1	219.84	0.79	3.17	0	0.79
8	.730	120	1	2	1	1	164.38	1.37	2.74	1.37	1.37
19	1.030	451	3	15	0	2	437.86	2.91	14.56	0	1.94
20	.899	401	0	24	1	2	446.05	0	26.70	1.11	2.22
21	.785	270	1	28	2	2	343.95	1.27	35.67	2.55	2.55
25	.793	386	3	49	3	2	486.76	3.78	61.79	3.78	2.52
26	.710	222	2	28	1	1	312.68	2.2	39.44	1.41	1.41
27	.583	90	3	23	2	0	154.37	5.15	39.45	3.43	0
28	.508	168	1	7	0	0	330.71	1.97	13.78	0	0
August											
2	.705	100	0	25	2	0	141.84	0	33.46	2.84	0
3	.748	167	2	9	0	2	223.26	2.67	12.03	0	2.67
4	.389	21	0	4	0	0	53.98	0	10.28	0	0

[a] Catch Per Unit Effort.

APPENDIX TABLE III-h: Test Fishing Catch and Effort Statistics for all Salmon Species in Areas 350 and 450, Hanson Island/Double Bay and Goletus Channel respectively, in 1981.

Date	Minutes Fished (1000's)	CATCH					C. P. U. E.[a]				
		Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum	Chinook
Area 350:											
June											
25	.597	35	3	4	0	1	58.63	5.03	6.70	0	1.68
26	.386	49	0	0	0	2	126.94	0	0	0	5.18
27	.379	21	0	1	0	0	55.41	0	2.64	0	0
July											
1	.255	27	1	5	0	0	105.88	3.92	19.61	0	0
2	.165	3	0	0	0	0	18.18	0	0	0	0
6	.190	5	1	2	0	0	26.32	5.26	10.53	0	0
12	.909	60	0	9	1	0	66.01	0	9.90	1.10	0
13	.391	30	1	22	2	1	76.73	2.56	56.27	5.12	2.56
14	.352	53	0	4	1	0	150.57	0	11.36	2.84	0
Area 450:											
July											
17	.470	12	0	0	0	0	25.53	0	0	0	0
19	.895	14	3	0	1	0	15.64	3.35	0	1.12	0
20	.235	1	0	0	0	0	4.26	0	0	0	0
August											
2	.580	10	5	0	0	0	17.24	8.62	0	0	0
3	.770	23	0	0	3		29.87	0	0	3.90	0
4	.580	22	3	0	1	0	37.93	5.17	0	1.72	0

[a] **C**atch **P**er **U**nit **E**ffort.

APPENDIX IV

Length and Age Data

APPENDIX TABLES IV-a, b: Length and Ages of Nimpkish and Non-Nimpkish Sockeye.

APPENDIX FIGURES IV-a, b: Length Frequencies by Age Class.

APPENDIX TABLE IV-a: Lengths and Ages[c] of Nimpkish Sockeye Sampled from Test Fishing in all Areas in 1981 and 1982

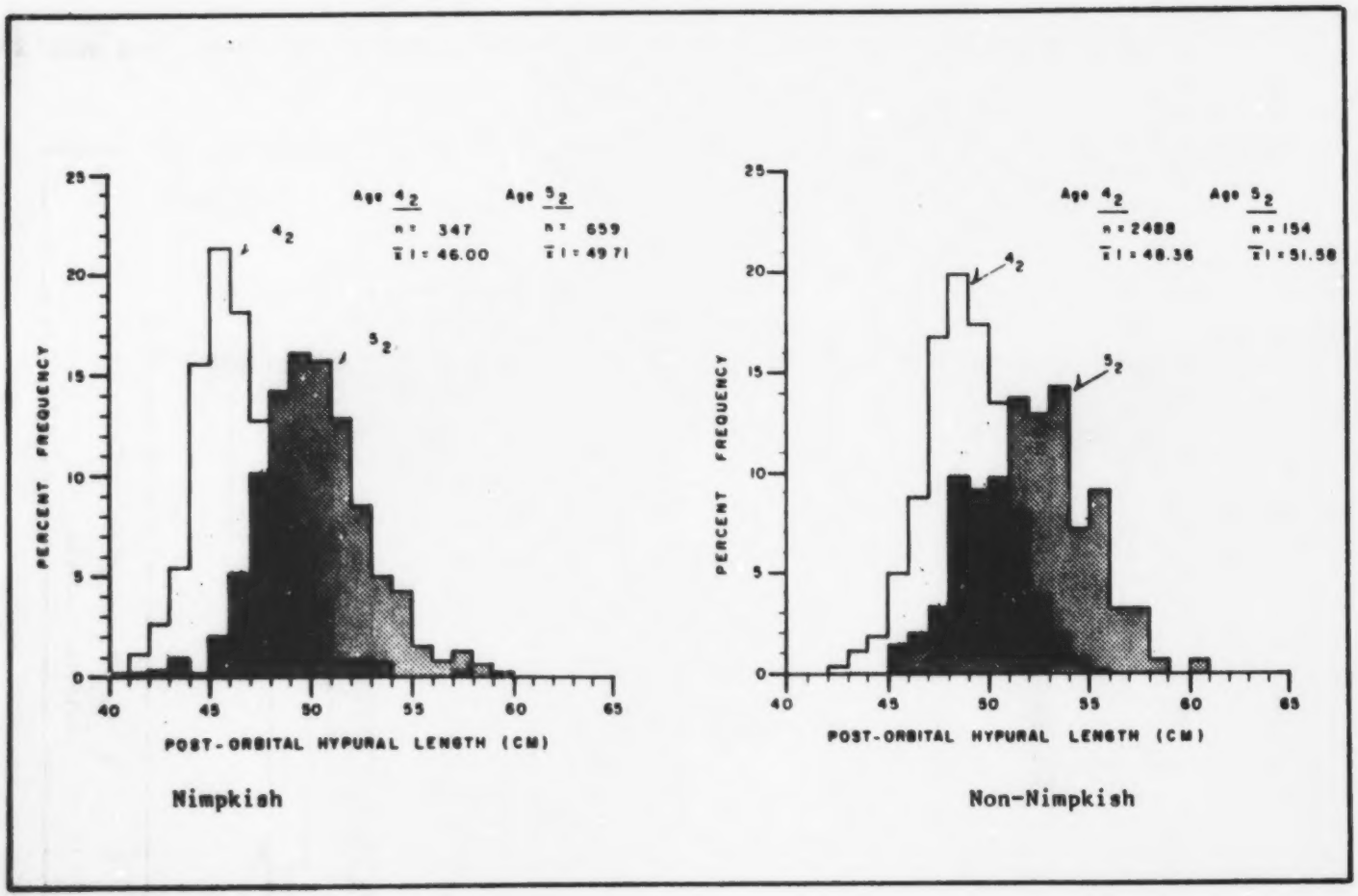
Length[a] (cm)	1981						1982					
	4_2	%[b]	5_2	%	5_3	%	4_2	%	5_2	%	5_3	%
40	0	0	1	.15	0	0	0	0	0	0	0	0
41	4	1.15	1	.15	0	0	0	0	0	0	0	0
42	9	2.59	2	.30	0	0	0	0	0	0	0	0
43	19	5.48	6	.91	0	0	1	1.82	1	1.25	0	0
44	54	15.56	1	.15	0	0	5	9.09	1	1.25	0	0
45	74	21.33	13	1.97	0	0	5	9.09	0	0	0	0
46	63	18.16	34	5.16	1	100.00	15	27.27	9	2.29	0	0
47	44	12.68	67	10.17	0	0	14	25.45	31	7.89	2	25.00
48	34	9.80	94	14.26	0	0	9	16.36	43	10.94	1	12.50
49	24	6.92	106	16.08	0	0	3	5.45	76	19.34	0	0
50	13	3.75	104	15.78	0	0	2	3.64	117	29.77	4	50.00
51	3	.86	85	12.90	0	0	0	0	19	4.83	0	0
52	3	.86	56	8.50	0	0	1	1.82	53	13.49	0	0
53	2	.58	33	5.01	0	0	0	0	25	6.36	1	12.50
54	0	0	28	4.25	0	0	0	0	8	2.04	0	0
55	0	0	10	1.52	0	0	0	0	7	1.78	0	0
56	0	0	5	.76	0	0	0	0	0	0	0	0
57	1	.29	8	1.21	0	0	0	0	2	.51	0	0
58	0	0	4	.61	0	0	0	0	1	.25	0	0
59	0	0	1	.15	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0	0	0	0	0

a Postorbital-hypural (P.O.H.) length.
b Percentage of the population of each age class that is a given unit of length.
c No Nimpkish sockeye were found to be in the 4_1 and 6_3 age classes.

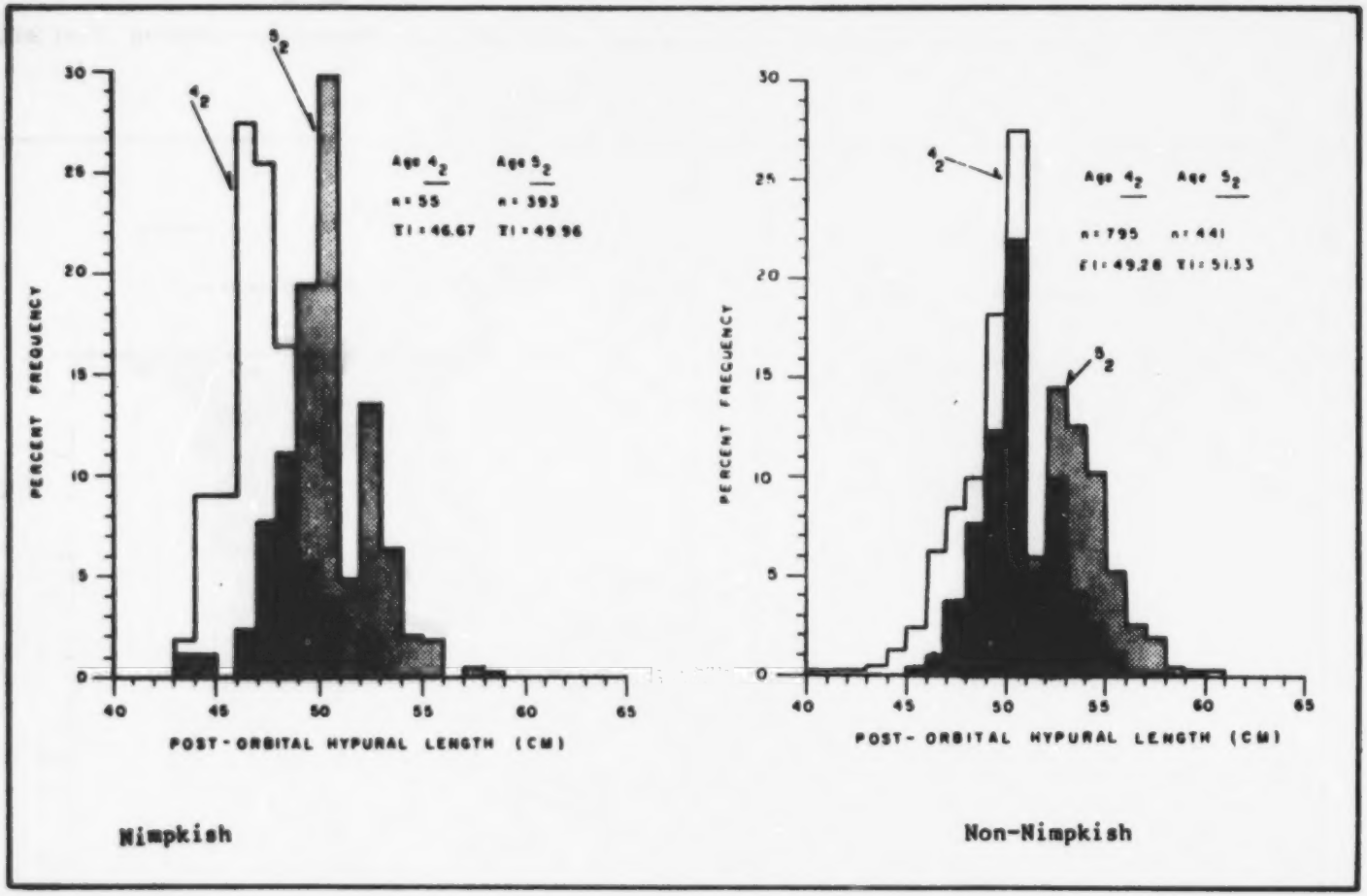
APPENDIX TABLE IV-b: Lengths and Ages of Non-Nimpkish Sockeye Sampled from Test Fishing in all Areas in 1981 and 1982.

Length[a] (cm)	1981										1982									
	4_1	%[b]	4_2	%	5_2	%	5_3	%	6_3	%	4_1	%	4_2	%	5_2	%	5_3	%	6_3	%
40	0	0	1	.04	0	0	0	0	0	0	0	0.00	2	0.25	0	0.00	0	0.00	0	0.00
41	0	0	2	.08	0	0	1	1.82	0	0	0	0.00	2	0.25	0	0.00	0	0.00	0	0.00
42	0	0	9	.36	0	0	2	3.64	0	0	0	0.00	2	0.25	0	0.00	0	0.00	0	0.00
43	0	0	18	1.13	0	0	3	5.45	0	0	0	0.00	3	0.38	0	0.00	0	0.00	0	0.00
44	0	0	49	1.97	0	0	7	12.73	0	0	0	0.00	19	2.39	0	0.00	1	2.63	0	0.00
45	0	0	124	4.98	2	1.30	9	16.36	0	0	0	0.00	27	3.40	1	0.23	4	10.53	0	0.00
46	0	0	217	8.72	3	1.95	7	12.73	1	16.67	0	0.00	50	6.29	4	0.91	2	5.26	0	0.00
47	0	0	417	16.76	5	3.25	5	9.09	1	16.67	0	0.00	66	8.30	16	3.63	9	23.68	0	0.00
48	0	0	497	19.98	15	9.74	10	18.18	0	0	0	0.00	78	9.81	33	7.48	1	2.63	1	16.67
49	2	50.00	434	17.44	14	9.09	2	3.64	0	0	0	0.00	145	18.24	54	12.24	2	5.26	2	33.33
50	1	25.00	338	13.59	15	9.74	6	10.91	1	16.67	0	0.00	218	27.42	96	21.77	14	36.84	0	0.00
51	1	25.00	199	8.00	21	13.64	1	1.82	0	0	0	0.00	40	5.03	26	5.90	1	2.63	0	0.00
52	0	0	92	3.70	20	12.99	2	3.64	2	33.33	0	0.00	78	9.81	64	14.51	1	2.63	1	16.67
53	0	0	49	1.94	22	14.29	0	0	1	16.67	0	0.00	33	4.15	55	12.47	1	2.63	1	16.67
54	0	0	21	.84	11	7.14	0	0	0	0	0	0.00	19	2.39	45	10.20	1	2.63	1	16.67
55	0	0	5	.20	14	9.09	0	0	0	0	0	0.00	9	1.13	23	5.22	0	0.00	0	0.00
56	0	0	2	.08	5	3.25	0	0	0	0	0	0.00	1	0.13	11	2.49	0	0.00	0	0.00
57	0	0	2	.08	5	3.25	0	0	0	0	0	0.00	1	0.13	8	1.81	1	2.63	0	0.00
58	0	0	1	.04	1	.65	0	0	0	0	0	0.00	0	0.00	4	0.91	0	0.00	0	0.00
59	0	0	0	.00	0	0	0	0	0	0	0	0.00	0	0.00	1	0.23	0	0.00	0	0.00
60	0	0	1	.04	1	.64	0	0	0	0	0	0.00	2	0.25	0	0.00	0	0.00	0	0.00
61	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
62	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
63	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
64	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
65	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
66	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
67	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
68	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
69	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

[a] Postorbital-hypural (P.O.H.) length.
[b] Percentage of the population of each age class that is a given unit of length.



APPENDIX FIGURE IV-a: Nimpkish and Non-Nimpkish Sockeye Length Frequency by Age Class, from Sampling in 1981.


PERCENT FREQUENCY
POST-ORBITAL HYPURAL LENGTH (CM)
Age 4₂ Age 5₂
n = 55 n = 393
FL = 46.67 FL = 49.96
Nimpkish
Age 4₂ Age 5₂
n = 795 n = 441
FL = 49.28 FL = 51.33
Non-Nimpkish

APPENDIX FIGURE IV-b: Nimpkish and Non-Nimpkish Sockeye Length Frequency by Age Class, from Sampling in 1982.

APPENDIX V

Commercial Catch and Effort Statistics in Area 12

APPENDIX TABLE Va: Weekly Commercial Sockeye Catches in Area 12 and Weekly Gear Counts[a] in Johnstone Straits in 1981.

	CATCH				EFFORT					
	Field Estimates		Final Catch Tally		Gordon Channel		Malcolm/Broughton		Johnstone Straits	
Week Ending	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine
6/3	841	308	1,336	773	N/A[b]	N/A	N/A	N/A	N/A	N/A
6/4	4,208	2,913	5,056	3,208	92	17	12	10	51	28
7/1	10,295	7,943	14,503	14,210	Closed		33	33	62	24
7/2	11,787	8,605	16,589	9,473	Closed		Closed		80	84
7/3	9,983	7,273	13,031	9,748	Closed		Closed		65	35
7/4	47,302	110,483	44,945	114,300	Closed		Closed		66	35
7/5	54,101	357,831	72,684	441,615	Closed		166	31	98	149
8/1	32,553	605,333	44,496	596,877	14	11	53	52	53	147
8/2	48,913	432,653	71,157	534,696	N/A	N/A	N/A	N/A	N/A	N/A
8/3	35,743	133,433	28,073	173,048	N/A	N/A	N/A	N/A	N/A	N/A
8/4	2,398	35,520	5,227	58,080	N/A	N/A	N/A	N/A	N/A	N/A
9/1	942	34,748	930	13,733	N/A	N/A	N/A	N/A	N/A	N/A
9/2	392	3,121	603	5,143	N/A	N/A	N/A	N/A	N/A	N/A
9/3	118	358	74	256	N/A	N/A	N/A	N/A	N/A	N/A
	TOTAL CATCH:		318,704	194,516						

[a] Gear Count each week on opening of fishery.
[b] Gear Count not available.

APPENDIX TABLE Vb: Weekly Commercial Sockeye Catches in Area 12 and Weekly Gear Counts[a] in Johnstone Straits in 1982.

	CATCH				EFFORT					
	Field Estimates		Final Catch Tally		Gordon Channel		Malcolm/Broughton		Johnstone Straits	
Week Ending	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine
6/3	-	-	-	-	Closed		Closed		Closed	
6/4	-	-	-	-	Closed		Closed		Closed	
7/1	-	-	-	-	Closed		Closed		Closed	
7/2	3,252	2,126	3,468	8,886	Closed		Closed		50	53
7/3	4,870	6,043	5,994	15,069	Closed		Closed		55	53
7/4	8,436	18,986	10,952	19,593	Closed		Closed		71	74
7/5	12,987	57,685	21,618	71,617	12	37	89	31	85	68
8/1	2,738	19,577	2,445	25,543	0	0	15[d]	15[d]	15[d]	60[d]
8/2	49,074	281,242	48,215	357,403	N/A	N/A	N/A	N/A	N/A	N/A
8/3	57,728	313,716	71,747	366,249	N/A	N/A	N/A	N/A	N/A	N/A
8/4	45,623	117,752	36,741	80,878	N/A	N/A	N/A	N/A	N/A	N/A
9/1	3,032	5,559	3,596	8,023	N/A	N/A	N/A	N/A	N/A	N/A
9/2	1,504	1,413	1,464	1,885	N/A	N/A	N/A	N/A	N/A	N/A
			483	1,615	N/A	N/A	N/A	N/A	N/A	N/A
	TOTAL CATCH:		206,723	956,761						

[a] Gear Count each week on opening of fishery.
[b] Gear Count not available.
[c] Area Closed to Commercial fishing.
[d] Strike - only Co-op and Quality Fish vessels fishing.